Litton

Electro-Optical Systems

INSTRUCTION MANUAL

MODEL M2160

IntelliVu CCTV Image Intensifier

PUBLICATION NO. D205689-061

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IMPORTANT SAFEGUARDS

Read and Retain the IntelliVu Instruction Manual - *Read the safety and operating instructions before installing, wiring and operating the unit. Retain them for future reference.*

Observe the Instructions and Warnings - *Observe the instructions for unit installation, wiring, and operation. Adhere to Warnings within the instructions.*

Direct IntelliVu Intensifier Servicing to Qualified Personnel - *Do not attempt to disassemble or service the image intensifier. To prevent the possibility of electric shock and unit damage, do not remove the IntelliVu screws or the cover. There are no user-serviceable parts inside. Direct servicing to qualified service personnel. Call Litton Customer Services at 1-800-569-8478.*

Avoid Safety Hazards - *Provide the correct power supply of DC-12 volts ±10 percent, 400 mA or AC-24 volts ±10 percent, 5 watts. Turn off the power during installation and wiring. Throughout installation and wiring, refer electrical tasks to qualified service personnel or system installers.*

In this publication WARNINGS and CAUTIONS appear before the applicable procedure as follows:

WARNING
WARNINGS INDICATE THE POSSIBILITY OF BODILY HARM.

CAUTION
CAUTIONS INDICATE THE POTENTIAL FOR DAMAGE TO EQUIPMENT.

INTELLIVU FEATURES

The Litton IntelliVu M2160, shown in Figure 1, provides an unmatched combination of performance, flexibility, and versatility in day and night imagery for 24-hour video surveillance.

The IntelliVu is a CCTV intensifier adapter designed to provide night vision capability to standard video cameras and lenses. At night the intensifier works by converting light to electrons, multiplying them, then reconverting them to light. During the day, the intensifier turns off and moves out of the optical path, allowing normal camera operation. The IntelliVu is optimized to work with near-infrared radiation which is prevalent in the night sky but is invisible to the human eye. Because the IntelliVu is not a thermal device, it will not function in absolute darkness.

SYSTEM FLEXIBILITY - The patented Litton design features an innovative switching device mounted within the IntelliVu so that a single system, utilizing one camera and lens, functions for both day and night; in color/monochromatic-green or B/W, depending on the camera.

STANDARD MOUNTS AND RAPID WIRING

- The IntelliVu is designed to accept standard C-mount lenses and CS-mount cameras.
- Rapid wiring is accomplished through plug type screw terminal connections.
- Adjustable 1/4-20 mounting holes are provided on both top and bottom of the IntelliVu permitting easy mounting to tripods and environmental enclosures.

AUTOMATIC DAY-TO-NIGHT SWITCHING

- An external light sensor provides input for automatic day-to-night switching, allowing continuous unattended surveillance.
- When appropriately wired, a digital potentiometer, integral to the IntelliVu, allows remote day-to-night crossover set point adjustment.

SUPERIOR NIGHT TIME CAPABILITY - The GEN III image intensifier features world class U.S. military technology and with the proper lens and camera is capable of providing usable video on overcast, moonless nights.

INTENSIFIER GAIN CONTROL FLEXIBILITY - IntelliVu AGC circuitry functions with the lens and the camera auto iris circuitry to compensate for varying nighttime light intensities. When necessary, gain can be adjusted manually for viewing particularly bright or dark areas within an otherwise consistently lighted scene.

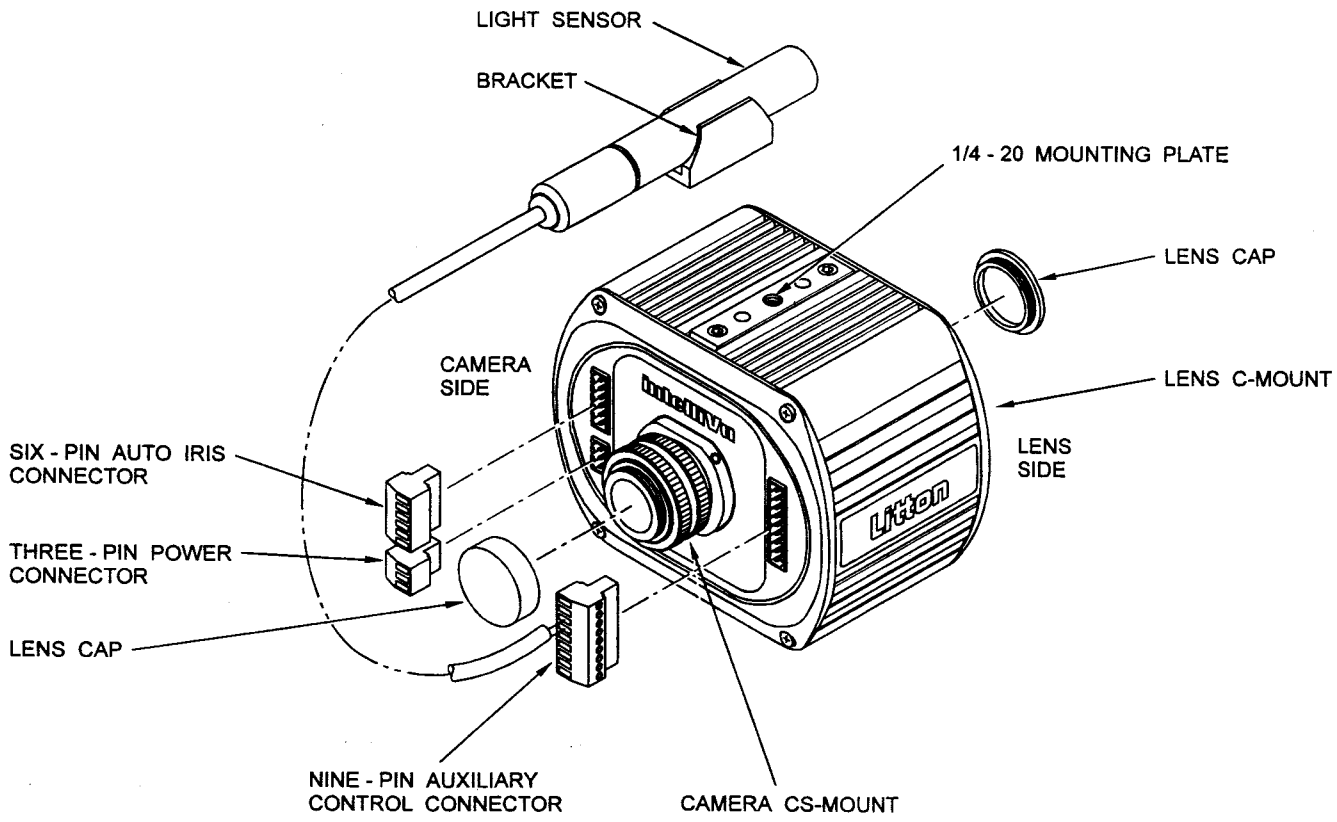


Figure 1. IntelliVu Components

SYSTEM OVERVIEW

SYSTEM PERFORMANCE - The IntelliVu is designed to be part of a system consisting of several components. To achieve maximum performance refer to the guidelines on camera and lens selection. Table 1 presents system requirements and specifications.

EQUIPMENT - The IntelliVu video system, shown in Figure 2, includes:

- Camera Lens - One Inch Format, Video Driven Auto Iris, C-Mount *
- IntelliVu with Light Sensor Assembly
- Camera - 1/2 Inch Format, CS-Mount *
- Auxiliary Controls - Optional *
- Monitor *

* User Furnished

LENS SELECTION - Lens f-number has a direct effect on system low-light performance. For maximum system performance in extremely low-light conditions, select a lens with the largest possible maximum aperture.

CAMERA SELECTION - Camera selection also has a direct effect on system performance. While the IntelliVu day channel optics allow the use of a color camera, a high-resolution/low-light B/W camera will greatly enhance system performance in very dark environments.

FIELD OF VIEW - The 1/2 inch format camera, when used in conjunction with the IntelliVu, displays a field of view that is equivalent to a one inch format camera. Use the formula for a one inch lens being used with a one inch camera for calculating system field-of-view.

SYSTEM MOUNTING

- The IntelliVu camera and lens mounts are capable of bearing up to a two-pound camera and a seven-pound lens under most pan/tilt conditions before user-furnished brackets are necessary.
- For increased mounting flexibility, adjust the set screws at either end of the top and bottom mounting plates to allow the plate to slide 1/8 inch in either direction.
- A two-point mounting option offers enhanced stability and alignment. Simply move one set screw to the center mount hole and use the set screw holes at either end to mount.

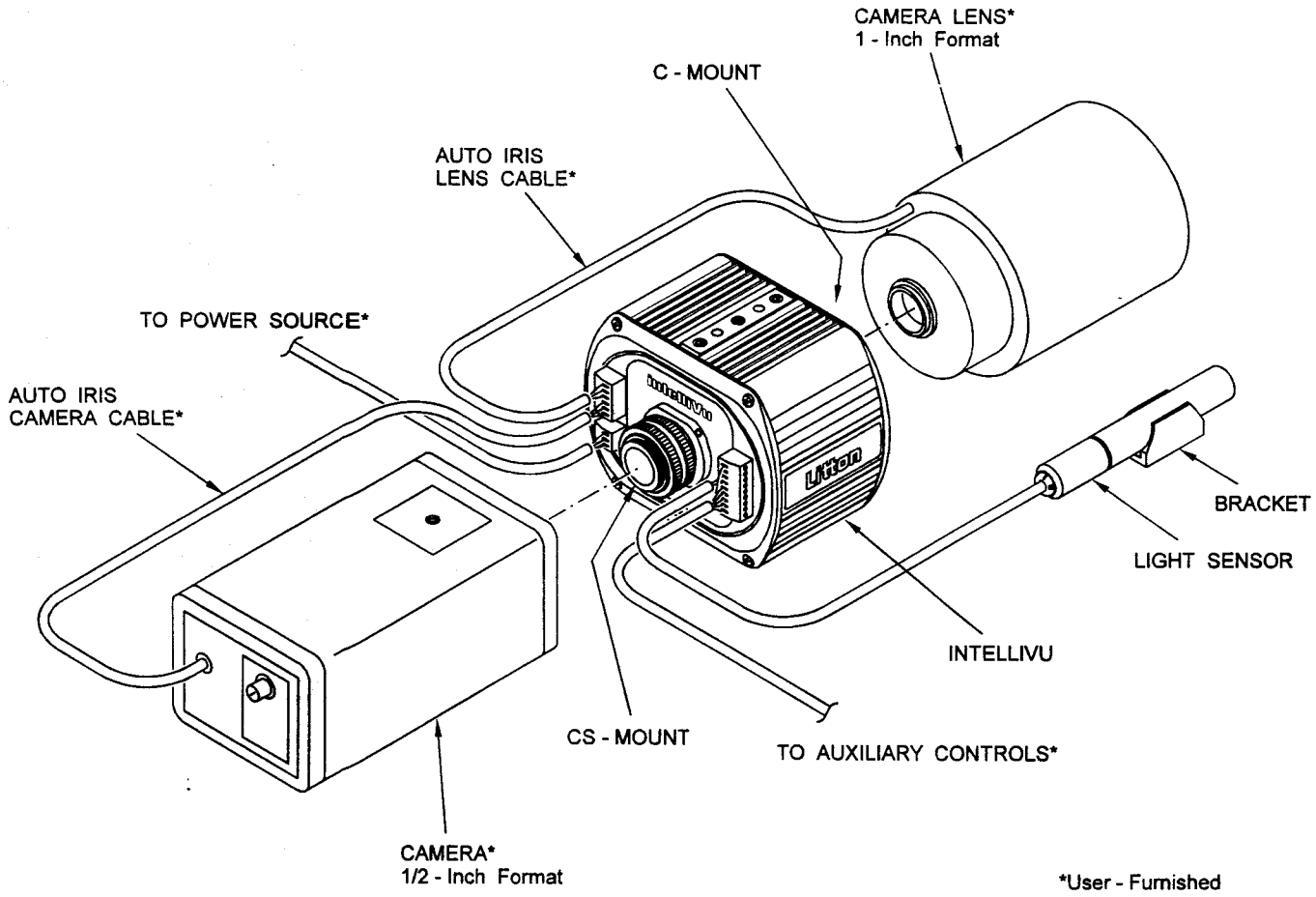


Figure 2. System Components

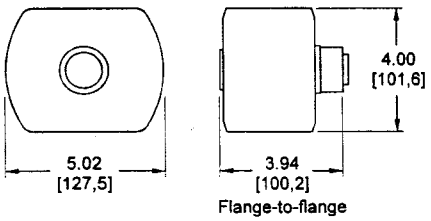
Table 1. Specifications and Requirements

INTENSIFIER SPECIFICATIONS	
Type	GEN III Filmed microchannel plate Proximity focused Non-inverting
Photo Cathode	Gallium Arsenide Peak spectral response 840 nanometers
Output	Phosphor Screen - P-43 Yellow-green, maximum radiant energy at 560 nanometers

ENVIRONMENT	
Temperature:	
Operating	0° to 122° F (-18° to 50° C)
Storage	-30° to 158° F (-35° to 70° C)
Humidity	95 % Max.
Altitude	12,000 ft. Max.

POWER	
External Power:	
DC	12 volts ±10 percent, 400 mA
AC	24 volts ±10 percent, 5 watts

SYSTEM SPECIFICATIONS	
System Sensitivity	When using an f1.4 lens and a camera having a faceplate sensitivity of 0.01 Lux the IntelliVu will provide 100% video with scene illuminations of 1 x 10^{-3} Lux. Usable (30%) video at scene illuminations of 2 x 10^{-5} Lux.
Field of View Calculation	For calculating system field of view, use the formula for a 1 inch lens used with a 1 inch camera
Dimensions inches (millimeters)	



Weight, including the light sensor	3.5 pounds (1.6 kilograms)

CAMERA REQUIREMENTS	
General:	
Format	1/2 inch format
Mount	CS-Mount with adjustable focus
Auto iris	Control auto iris using video signal
Note: DC irising is not acceptable	
Black/White:	
Center Resolution	570 HTVL * minimum
Faceplate Sensitivity	0.01 Lux to produce 100% video
Color:	
Center Resolution	430 HTVL * minimum
Faceplate Sensitivity	0.1 Lux to produce 100% video
* HTVL - Horizontal Television Line	

LENS REQUIREMENTS	
Format	1 inch format
Mount	C-mount
Auto Iris Control	By video signal Capable of at least f360

PROVIDING POWER TO THE INTELLIVU

WARNING
THROUGHOUT ASSEMBLY, WIRING AND ELECTRICAL TASKS MUST BE COMPLETED BY QUALIFIED SERVICE PERSONNEL OR SYSTEM INSTALLERS.

CAUTIONS
- **ADHERE TO EXTERNAL POWER REQUIREMENTS:**
  DC - 12 VOLTS ±10 PERCENT, 400 MILLIAMPERES
  AC - 24 VOLTS ±10 PERCENT, 5 WATTS
- **AVOID THE POSSIBILITY OF SHORTENING INTENSIFIER LIFE. EXCEPT DURING THE FOLLOWING PROCEDURE, DO NOT APPLY POWER TO THE INTELLIVU UNLESS THE LENS-SIDE OPENING IS CAPPED OR A FUNCTIONING AUTO IRIS LENS IS INSTALLED.**

1. Wire the three-pin power connector, provided with the IntelliVu, to the user-furnished power source. Orient the connector wire-lock screws to face away from center, as shown in Figure 3.

   NOTE: The +12V and COMMON DC line connections are interchangeable.

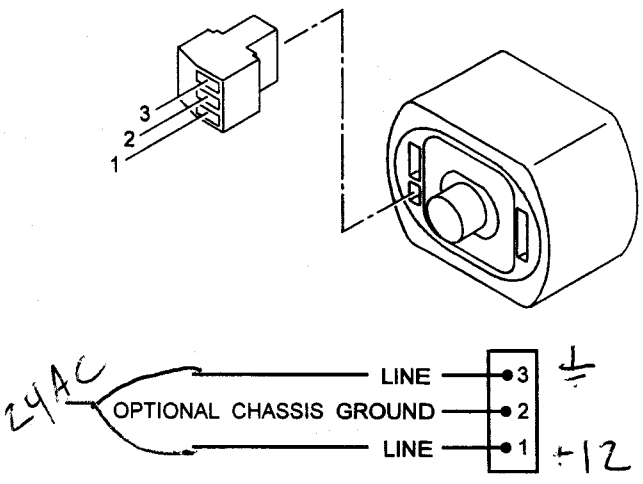


Figure 3. Wiring the Three-Pin Power Connector

2. Remove the IntelliVu camera-side lens cap.
3. Insert the wired connector into the IntelliVu rear panel. (Refer to Figure 3.)
4. Remove the IntelliVu lens-side lens cap.
5. Look directly into the IntelliVu camera-side and check for a green glow. The glow indicates that the IntelliVu is functioning properly.
6. Immediately after viewing the glow, replace the lens-side lens cap and disconnect the power.
7. If there is no evidence of a glow, do not proceed with the installation. Call Litton Customer Services at 1-800-569-8478.

MOUNTING THE CAMERA

1. Prepare the camera as follows.
   - Remove the lens cap and be sure the CCD face-plate is free of lint and dust particles. Refer to the camera manual for the recommended cleaning procedure.
   - Verify that the lens mount is in CS mode. Refer to the camera manual to make adjustments if necessary.

CAUTIONS
- **THE PREFERRED METHOD OF REMOVING DUST FROM OPTICAL COMPONENTS IS CANNED AIR. COTTON SWABS AND ISOPROPYL ALCOHOL MAY BE USED FOR FINGER PRINTS. NEVER USE TISSUE, HARSH SOLVENTS, OR ABRASIVE CLEANERS.**
- **DO NOT USE TOOLS TO TIGHTEN CAMERAS OR LENSES.**
- **HAND TIGHTEN ONLY.**

2. Remove the IntelliVu camera-side lens cap and if necessary use canned air to clean lint and dust from lens.
3. Thread the camera onto the IntelliVu. Hand tighten.
4. After the camera bottoms, continue to turn the camera to a horizontal position with the top side facing down.

   NOTE: With the camera positioned top-side-down, a normal, upright image appears on the monitor.

C-mount camera installation is nonstandard for this system and not recommended. If you must use a C-mount camera or need information about a non-standard installation, call Litton Customer Services at 1-800-569-8478.

SETTING THE CAMERA-TO-INTENSIFIER FOCUS

INTRODUCTION - In this procedure you will be focusing the image from the intensifier output onto the camera CCD. With the correct light level entering the IntelliVu lens-side opening, a faint hexagonal or honeycomb pattern will be visible on the monitor. The camera-to-intensifier focus is properly set when the pattern is as sharp as possible. Once focus has been set, it should not be changed during subsequent procedures.

IMPORTANT PREREQUISITE - This procedure applies to a first time set-up. For setting the camera-to-intensifier focus on a previously operational system, perform these steps before continuing:

1. Remove the lens and check to be sure the IntelliVu is in night mode:
   - **Night Mode**: The intensifier photocathode is visible as a round, reflective, blue surface.
   - **Day Mode**: The camera CCD is visible as a rectangular object, similar to a common integrated circuit chip.
2. If the system is in day mode, cover the light sensor and allow the IntelliVu to reset to night mode before proceeding.

CAUTION

AVOID THE POSSIBILITY OF SHORTENING INTENSIFIER LIFE. EXCEPT DURING THE FOLLOWING PROCEDURE, DO NOT APPLY POWER TO THE INTELLIVU UNLESS THE LENS-SIDE OPENING IS CAPPED OR A FUNCTIONING AUTO IRIS LENS IS INSTALLED.

1. Be sure the IntelliVu is in night mode. Refer to Important Prerequisite, above, if there is doubt.
2. Be sure the camera is providing video to the monitor.
3. Be sure power has been supplied to the IntelliVu.
4. Remove the IntelliVu lens-side lens cap.
5. Control the light level entering the lens-side opening until a faint honeycomb image similar to Figure 4, appears on the monitor. Use one of the following methods for controlling the light level.
   - Shield - Vary the distance between your hand, or some other light-colored object, and the IntelliVu lens-side opening.
   - Lens - Install a manual lens on the IntelliVu and vary light level using the f-stop adjustment.

   NOTE: The honeycomb pattern may not be visible if the initial camera focus setting is too far out of adjustment. Course focus can usually be obtained by blocking the IntelliVu lens-side opening and adjusting the camera until the intensifier random noise patterns, seen as sparkles of light, are visible. If using a manual lens, course focus can be obtained by adjusting the camera until an actual image starts to focus.

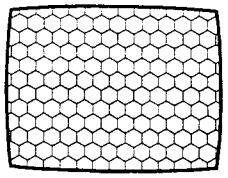


Figure 4. Honeycomb Pattern, In Focus

6. Once the honeycomb image is visible, maintain the light level entering the IntelliVu, while adjusting the camera focus apparatus until the pattern is fully sharpened.

   NOTE: A sharpened honeycomb pattern indicates proper camera-to-intensifier focus, regardless of other images produced by the manual lens.

7. Set the focus lock on the camera. Refer to the camera manufacturer's instructions.
8. Immediately disconnect power and replace the lens-side lens cap.
9. Use a 1/16 inch Allen wrench to tighten the two camera rotation lock set screws located on the camera-side of the IntelliVu.
10. If the procedure does not provide the desired result, call Litton Customer Services at 1-800-569-8478.

INSTALLING THE LENS

CAUTIONS:

- **THE INTELLIVU LENS COLLAR IS FACTORY-SET. CALL LITTON CUSTOMER SERVICE AT 1-800-569-8478 BEFORE ATTEMPTING ANY ADJUSTMENT.**
- **DO NOT USE TOOLS TO TIGHTEN THE LENS. HAND TIGHTEN ONLY.**
- **THE PREFERRED METHOD OF REMOVING DUST FROM OPTICAL COMPONENTS IS CANNED AIR. COTTON SWABS AND ISOPROPYL ALCOHOL MAY BE USED FOR FINGER PRINTS. NEVER USE TISSUE, HARSH SOLVENTS, OR ABRASIVE CLEANERS.**

1. Remove the IntelliVu lens-side lens cap and if necessary use canned air to clean lint and dust from the intensifier faceplate.
2. Carefully thread the lens into the IntelliVu lens-side C-mount.

WIRING THE AUTO IRIS CIRCUITRY

INTRODUCTION - Unlike a typical camera/lens installation, the auto-iris signal from the camera will be routed through the IntelliVu first, and then onto the lens.

Often, there will be enough cable supplied with the lens so that the excess can be used to connect the IntelliVu to the camera.

1. Connect the cable from the auto iris lens to the six-pin auto iris connector as shown in Figure 5. Orient the connector wire-locking screws to face away from center as shown.
2. Wire the six-pin auto iris connector onto the user-furnished camera cable as shown.
3. Connect the auto iris camera cable to the connector supplied with the camera in accordance with the manufacturer's instructions.
4. Insert the six-pin connector into the IntelliVu rear panel as shown.

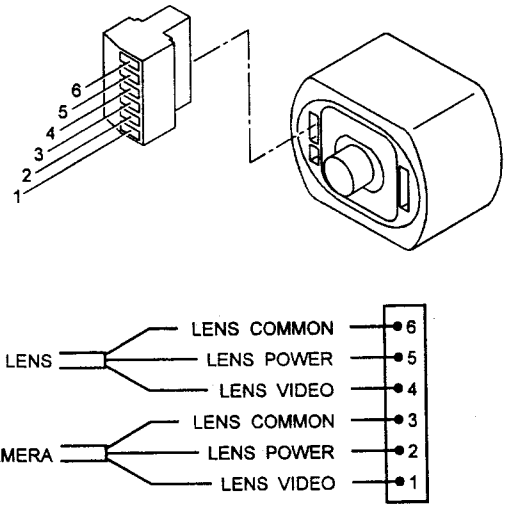


Figure 5. Wiring the Six-Pin Auto Iris Connector

NOTE: LENS COMMON wires from the camera and lens may be combined and inserted into either Pin 3 or 6. This also true of the LENS POWER wires which may be combined and inserted into Pin 5 or 2. Similarly the LENS VIDEO wires may be combined and inserted into Pin 1 or 4.

WIRING THE AUXILIARY CONTROL CONNECTOR

INTRODUCTION - Certain optional IntelliVu functions can be accessed through the auxiliary control connector by means of contact closures as shown in Figure 6. User requirements dictate which functions are employed and what type of switching devices are appropriate.

1. Wire the nine-pin auxiliary control connector as shown. The customer switch panel schematic shows typical switch types for control of all auxiliary functions.
2. See Table 2 for auxiliary control functions, operations, and recommended contact or switch types.

CAUTION
THE INTELLIVU EXTERNAL LIGHT SENSOR MUST BE WIRED TO THE NINE-PIN AUXILIARY CONTROL CONNECTOR FOR THE INTELLIVU TO FUNCTION PROPERLY.

3. The IntelliVu external light sensor has been wired at the factory. If it is necessary to rewire the sensor, connect the sensor wires to Pins 6 and 7 of the connector.

   NOTE: There is no polarity significance to the red and black sensor wires. They may be wired to either of the pins.

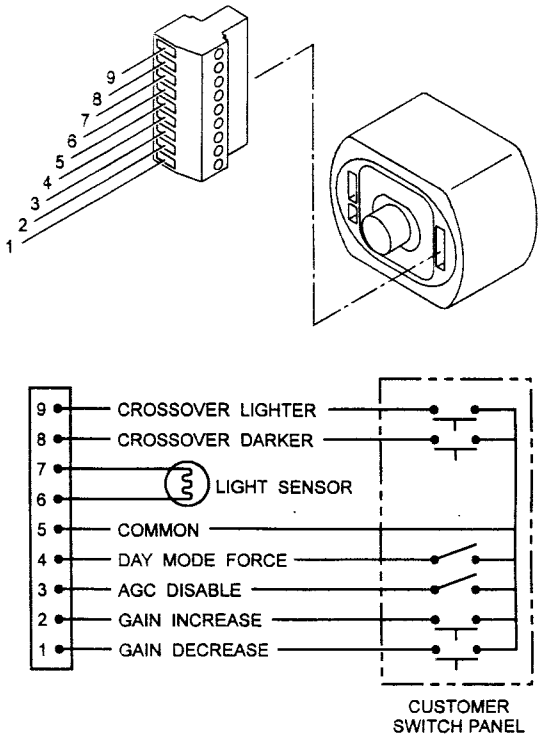


Figure 6. Wiring the Auxiliary Control Connector

Table 2: Auxiliary Control Functions - Nine-Pin Connector

Pin No.	Function	Description of Operation	Expected Result	Recommended Contact or Switch Type
1	INTENSIFIER GAIN DECREASE	Manually decrease gain	Lower gain level to eliminate bloom or wash-out on subjects positioned near a bright light source.	Momentary
2	INTENSIFIER GAIN INCREASE	Manually increase gain	Raise gain level to permit view of shaded, darker areas.	Momentary
3	Automatic Gain Control (AGC) DISABLE	Enable manual gain control through Pins 1 and 2	Intensifier will operate at the last, previously set manual gain setting until adjusted through Pin 1 or Pin 2.	Latching
4	DAY MODE FORCE	Override light sensor input by selecting day mode.	IntelliVu will operate in day mode regardless of light level.	Latching
5	**COMMON**	Completes the circuit with the wired function pin: Connect Pins 1, 2, 3, 4, 8, and 9 with Pin 5 COMMON, to activate the designated function.	Operation of selected function	N/A
6	SENSOR 1	Provides wiring connection for external light sensor through Pin-6 and Pin-7.		N/A
7	SENSOR 2	If light sensor is not connected, IntelliVu normally defaults to night mode.		N/A
8	CROSSOVER DARKER	Remotely revise set point where IntelliVu switches from day mode to night mode to a darker level.	IntelliVu will operate in day mode for a longer duration.	Momentary
9	CROSSOVER LIGHTER	Remotely revise set point where IntelliVu switches from day mode to night mode to a lighter level.	IntelliVu will operate in day mode for a shorter duration.	Momentary

AGC - Automatic Gain Control. Intensifier operates at AGC as default.

BENCH-TESTING THE SYSTEM

After the IntelliVu system has been completely assembled and wired, it should be bench-tested to ensure that it is fully operational.

SYSTEM FOCUS - The IntelliVu has been designed to accept a wide variety of fixed focal length and zoom lenses. While the factory setting of the C-mount lens collar should be satisfactory for many applications, there are cases where adjustment may improve overall system performance. This is especially true of wide angle lenses such as the 12.5mm and some zoom lenses.

Adjustment of the IntelliVu C-mount collar is equivalent to what is commonly referred to as back focus adjustment on a typical system. (Refer to lens instructions for adjustment of zoom lens tracking).

It should be noted that no changes should be made to the camera to intensifier focus setting which was covered earlier in this manual.

CAUTIONS

- **CONTACT LITTON CUSTOMER SERVICES AT 1-800-569-8478 BEFORE ATTEMPTING TO ADJUST THE LENS COLLAR.**
- **NEVER ADJUST THE LENS MOUNTING COLLAR BELOW FLUSH WITH THE INTELLIVU FRONT PANEL. THIS MAY CAUSE BINDING OF THE INTERNAL MECHANISM.**

ADJUSTING THE C-MOUNT LENS COLLAR

1. To adjust the lens mounting collar, loosen the set screw as shown in Figure 7 with a 1/16 inch Allen wrench.
2. Adjust the collar by rotating as needed. Trial and error will determine the best setting for overall system performance. When proper focus has been achieved, retighten the set screw.

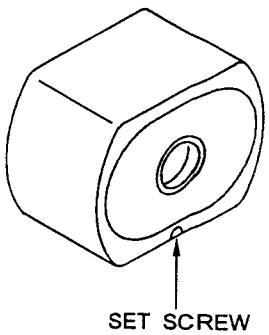


Figure 7. Lens-Mount Set Screw

SYSTEM BENCH TEST CHECKLIST

1. If the camera has an AGC switch, it should be in the on position.
2. The auto-iris lens peak/average potentiometer should be set to average and the level adjustment should be at the lowest practical setting.
3. Connect the camera to a monitor. Supply power to system components.
4. If sufficient light is present, the system should be operating in day mode.
   - Covering the light sensor with an opaque material should cause the system to switch to night mode.
5. If there is a question about whether the light sensor is working or not, disconnect the nine-pin auxiliary control connector. If the system does not switch to night mode within approximately ten seconds, call Litton Customer Services at 1-800-569-8478.
6. Verify that the auto-iris is functioning.
7. Check the day mode force function if applicable.
8. Check the gain control - Carefully read and understand the section on controlling the intensifier gain level before attempting to check for functionality.
9. Check the crossover set point - Wait until system is installed before evaluating crossover set point.

SYSTEM INSTALLATION

INTRODUCTION - The IntelliVu has been designed to operate under the same environmental conditions as standard camera systems. When operating outdoors a suitable environmental enclosure must be provided.

MOUNTING - The IntelliVu has been designed to be the main system mounting point and can support a camera weighing up to two pounds and a lens weighing up to seven pounds without additional brackets.

For increased mounting flexibility, adjust the set screws at either end of the top and bottom mounting plates to allow the plate to slide 1/8 inch in either direction.

A two-point mounting option offers enhanced stability and alignment. Simply move one set screw to the center mount hole and use the set screw holes at either end to mount.

LIGHT SENSOR - The light sensor provided with the IntelliVu works in conjunction with the crossover circuitry to switch the system between day and night modes. The angle view of the sensor does not necessarily correspond to the angle of view of the lens. Furthermore it sees the average scene illumination and will not compensate fully for small bright or dark areas.

Follow these guidelines when installing the light sensor:

- Install the mounting bracket with either the self-adhesive loop and hook fasteners or use the two screw-holes.
- Aim the light sensor in the same direction as the lens.
- Place the light sensor as close as possible to the front of the enclosure.
- Be sure the light sensor has an unobstructed view and is not in the shadow of the lens.

OPERATION

INTRODUCTION - Operating a camera system with the IntelliVu installed differs in a number of respects from the operation of a conventional camera and lens system. With a conventional system, the auto-iris is set to allow enough light to reach the camera's CCD so that it can produce full video. With the IntelliVu installed and operating in night mode the camera is not seeing the light from the lens but rather the light from the intensifier output. With a conventional system the auto-iris is attempting to allow constant light levels to reach the camera CCD. With an intensifier installed the function is similar but the lens is now limiting the light level reaching the intensifier faceplate rather than the camera CCD. Since intensifier output brightness is proportional to light input, the camera will maintain a constant video level. The IntelliVu AGC circuitry works by monitoring the camera's auto-iris signals as well as the brightness of the intensifier output and makes constant adjustments to maintain consistent intensifier output.

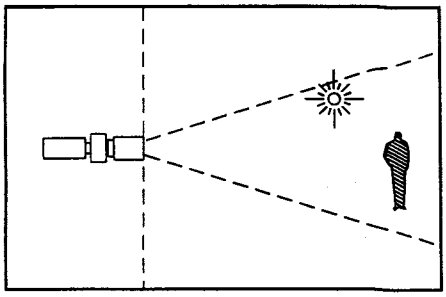
OPERATIONAL GUIDELINES

The IntelliVu is designed to operate with natural nighttime light sources, without the aid of artificial lighting. Bright lights in an otherwise dark scene have the potential to cause intensifier damage.

- When using an intensified camera, special care must be taken to avoid including point light sources in the field of view when the camera is in a fixed position. Prolonged exposure will cause permanent photocathode burn spots to appear.
- The auto-iris is capable of controlling overall light level but cannot protect against point light sources.
- The light sensor provides protection from overall light levels but not point light sources.
- Use day mode whenever possible. An acceptable day mode image will probably not be improved by switching to night mode.
- Use manual gain control only when necessary. Return the system to AGC for unattended operation.

CAUTIONS

- **THE AUTO-IRIS LENS IS THE PRIMARY MEANS OF PROTECTION AGAINST HIGH LIGHT DAMAGE TO THE IMAGE INTENSIFIER. THE LEVEL POTENTIOMETER MUST BE ADJUSTED TO THE LOWEST PRACTICAL SETTING TO ENSURE MAXIMUM INTNESIFIER LIFE.**
- **DO NOT INCLUDE BRIGHT LIGHT SOURCES WITHIN THE IMAGE AREA. REDIRECT THE SYSTEM OR USE ZOOM TO EXCLUDE LIGHT SOURCE. SEE FIGURES 8 AND 9.**
- **DARK SPOTS CAUSED BY PHOTOCATHODE BURNING ARE NOT CONSIDERED DEFECTS AND ARE NOT COVERED UNDER THE WARRANTY.**



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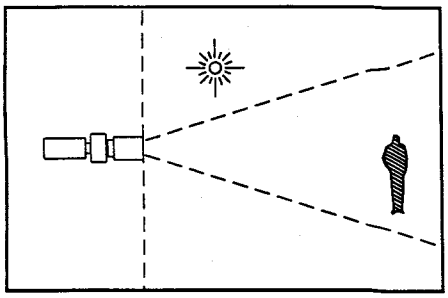

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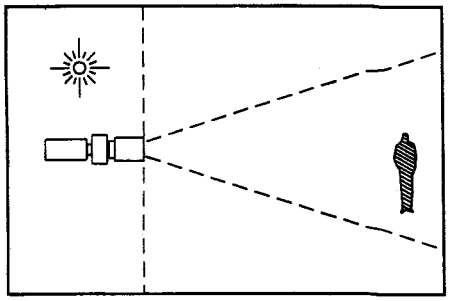
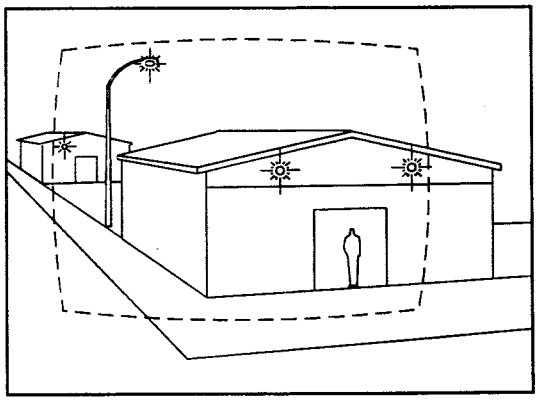


BEST

Figure 8. Camera Placement

EXISTING LIGHT - In many industrial security applications, the presence of man-made lighting is unavoidable. Choose camera locations and viewing angles that avoid problematic lighting situations.

IR LIGHTING - Color cameras will function with IR light since the intensifier is sensitive to IR light. IR lighting may be used effectively under especially demanding circumstances.



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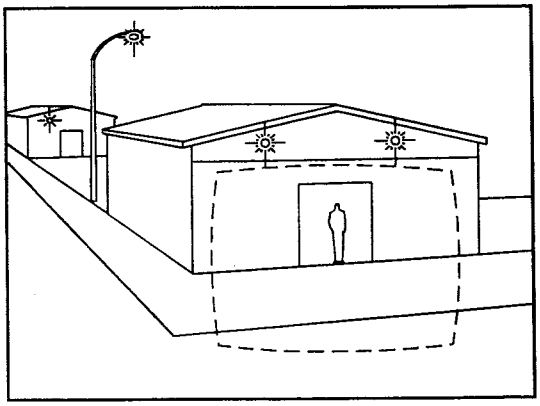

PROPER FIELD-OF-VIEW SELECTION

Figure 9. Choosing Field of View

CONTROLLING THE INTENSIFIER GAIN LEVEL

INTRODUCTION - IntelliVu has been designed with AGC (automatic gain control) to provide the best picture quality under the greatest variety of operating conditions. Under certain circumstances the operator may wish to control intensifier gain manually. Examples might include an area near a bright light source where image blooming occurs, or in a shadow where there is insufficient detail.

INTENSIFIER LIFE SPAN - Intensifier life is proportional to light input. The more light reaching the intensifier, the shorter it's life. High gain levels correspond to small lens aperture settings and result in low light levels reaching the intensifier. Therefore, it is highly desirable to operate IntelliVu at the highest possible gain level.

CAUTION

- **WHEN OPERATING THE INTELLIVU IN NIGHT MODE, EVEN IF THE INTENSIFIER IS AT MAXIMUM GAIN, THE AUTO IRIS SHOULD BE ABLE TO CONTROL THE INPUT LIGHT LEVEL. IF THE IMAGE BLOOMS OR WASHES OUT, IT IS NOT SAFE TO OPERATE IN NIGHT MODE.**
- **TO REDUCE RISK OF INTENSIFIER DAMAGE, IT IS RECOMMENDED THAT THE SYSTEM BE RETURNED TO AGC MODE WHEN UNATTENDED.**

1. To set gain manually, the default AGC circuitry must first be disabled by completing the circuit between Pin 3 (AGC-DISABLE) and Pin 5 (COMMON). See Figure 6.
2. Gain is set in an incremental fashion by momentary contact between either Pin 1 (GAIN DECREASE) or Pin 2 (GAIN INCREASE) and Pin 5 (COMMON). See Figure 6. Maintaining contact causes the gain to step up or down at a fixed rate until contact is broken.
   - Decrease gain when - Area of interest blooms or washes out
   - Increase gain when - Area of interest is too dark or lacks detail.

   NOTE: When redirecting the system toward an area containing significant illumination, it may be desirable to use day mode force rather than reducing intensifier gain. Doing so will reduce the risk of intensifier damage if the area is to be viewed for a prolonged period of time.

ADJUSTING THE DAY/NIGHT CROSSOVER SET POINT

CROSSOVER CONSIDERATIONS - The light level at which the IntelliVu automatically switches between day and night modes has been preset at the factory and will be adequate for many operating conditions. As a general guide, use day mode for the longest possible duration to extend intensifier life.

Since the crossover set point can be effected by a number of variables the factory setting may need to be adjusted based on specific operating conditions and system equipment. Following are examples of variables which effect crossover set point:

- Light sensor location
- Sensitivity difference between color and B/W cameras
- Lens f-number

The following procedure is recommended for adjusting the crossover set point.

1. Begin with the IntelliVu operating in day mode. Adjust the crossover set point toward crossover darker by maintaining switch contact for approximately ten seconds. This will prevent the system from switching to night mode as darkness falls.
2. As night falls, observe the image on the monitor. When the video level becomes unacceptably low, adjust toward crossover lighter until system switches to night mode.
3. Fine tuning may be achieved by making slight adjustments on successive evenings. Each momentary switch contact results in an incremental, one step change in the crossover set point

TROUBLESHOOTING

Table 3 presents solutions for common system problems that may occur.

Table 3: Problem Solving

Problem	Possible Cause	Solution
1. System will not achieve sharp camera to intensifier focus	Camera is not set to CS-mount:	Set camera mount to CS-mount.
2. Cannot achieve system focus	IntelliVu C-mount collar requires adjustment.	Adjust collar as described in Bench-testing the system.
3. Image blooms or washes out when in night mode	• Scene illumination is too high for auto iris to adequately control intensifier input light level. • Auto-iris lens cannot adequately control the input light level when the intensifier is set to maximum gain.	• Adjust crossover set point to a darker level. • Use day mode force to turn intensifier off.
4. Manual gain control will not function	AGC DISABLE has not been selected	Select AGC DISABLE
5. Image on monitor is upside down	Camera is incorrectly mounted	Make sure camera is mounted topside down
6. Picture consists only of noise	Six-pin auto iris connector is not plugged in, leaving auto iris closed	Make sure six-pin auto iris connector is wired properly and plugged in securely
7. IntelliVu will not switch to day mode	One of the following conditions: • Open circuit in light sensor wiring • Crossover set point is adjusted too far toward crossover lighter • Mechanical malfunction	One of the following solutions: • Check light sensor connections. Make sure nine-pin auxiliary control connector is plugged in securely. • Adjust crossover set point toward crossover darker. • Call Litton Customer Services at 1-800-569-8478.
8. IntelliVu will not switch into night mode	One of the following conditions: • Day mode force has been selected • Crossover set point is adjusted too far toward crossover darker • Mechanical malfunction	One of the following solutions: • Check position of day mode force contacts • Adjust crossover set point toward crossover lighter. • Call Litton Customer Services at 1-800-569-8478..
PARTS AND SERVICE: Litton Customer Services at 1-800-569-8478.		

Notes taken from L3/Litton engineer.

NOTES

1. Camera can be 1/2" or 1/3" c/cs mount Format
2. Lens can be 1" or 1/2 c/cs mount format
3. Try to get a lens with F1.3 or better for maximum nightvision.

3. CCD camera must have Lux rating of .01 or better.

4. Be very carfull not to leave intensifier on in bright lights or sun, especially when setting up the system. makes Sure the lighting will not be to much for the intensifier during testing!!!

5. Read all the instructions!!!